WATERING OPTIONS FOR LIVESTOCK
PASTURE PUMP & HYDRO RAM

Author: Phillip Burns, Agricultural Economist, NRCS, Maine

Purpose: To inform farmers about two livestock watering systems – pasture pumps and hydro rams

Brief Explanation of the Systems:

1. Pasture pumps are powered by an animal pushing against a sliding bar which releases water into the pump's drinking bowl. The animal learns that pushing against this bar delivers water.

2. Hydro-rams use the energy created by falling water to move water both horizontally and vertically. A 2-foot fall of 1-3 gallons per minute is enough to drive the system.

Conclusions:

1. Interviewed farmers reported that pasture pumps are easily installed relatively low cost, quickly removed in the fall and reinstalled in the spring, and have low maintenance.

   There was some disagreement regarding how rapidly animals could learn to use the pump.

   Some farmers did not like the fact that only one animal could drink at a time. They said tha some animals would not wait for a turn.

   It cost an average of $2 per animal yearly to provide water using pasture pumps.

2. Hydro-rams are inexpensive. They should be installed in a relatively clean stream in order to prevent fouling of the intake and pipes.

   By using a hydro-ram one Maine farmer was able to provide water to his herd for $1 per cow per year.

3. Either system improves water quality. Animals no longer drink directly from streams, ponds, or springs, polluting these water sources with their wastes and eroding banks.

For further information contact your local office of the Natural Resources Conservation Service. They are listed in the phone book under United States Government – Agricultural Department. All programs and services of the Natural Resources Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

WATERING OPTIONS FOR LIVESTOCK

Background

Pastures are growing in importance in Maine. Increasing costs of hay production and a growing interest in short duration grazing are encouraging more and more Maine livestock farmers to pasture their animals….efficiently.

Animals in pastures need water. The challenge is to get water to the animals conveniently, economically, and without damaging the environment. Each pasture situation is different – is power available? What is the topography? What is the water source? How far away is it? Different livestock watering systems should be known and considered by farmers.

This pamphlet describes a "pasture pump" system where the animal "pumps" its own water and a "hydro-ram" where falling water powers the pump.

Another publication, "Innovative Livestock Watering System" describes a "quick move" system using 50-75 feet of garden hose to access water from couplings in black plastic "mainlines". In that system animals (up to four at a time) drink from tubs with float and valve assemblies which allow quick refill. Water in the mainlines is under pressure supplied by pumps. Contact your local Natural Resource Conservation Service Center for a copy of this brochure and more information.

Pasture Pumps

Seven Maine farmers who have used one or more pasture pumps for an average of 4 years each provided information on their experiences.

Black plastic pipe, with a foot valve at the water source, carries water to a pasture pump. Forward movement of a sliding bar brings water into the pump's bowl. Pasture pumps generally are bolted to elevated platforms.

For the most part, farmers liked pasture pumps for:

- Ease of initial installation
- Relatively low cost
- Low maintenance
- Quick fall removal and spring reinstallation

1) Pump costs averaged about $300 ($350 in 1990). The amount of black plastic pipe needed varied significantly depending on the distance of the pump from the water source.

2) Most the pipe used was 1 inch diameter. Distances ranged from 4 to 100 feet with an average of about 40 feet. Cost averaged $1 per foot.

Vertical lift varied from an estimated 2 feet to 10 feet and averaged about 6 feet.

Most of the intakes are under 2 to 3.5 feet of water.

3) Farmers bolt the pumps to platforms or pallets which are staked to the ground.

Pasture pumps use psychology. Animals learn that pushing with their noses bring water.

Only one farmer moved the pumps. The pumps were on pallets and were moved about 10-15 feet whenever the watering site became sloppy. (Another farmer put 12-18 inches of gravel on a filter fabric in a 25 x 30 foot area. Two pumps sit on metal plates which are on pressure treated poles driven 5 feet into the ground. This approach keeps the drinking area dry, and relatively undisturbed. (The pads cost about $200 each.)

4) Ponds were the water source for about half the pumps. Springs and streams were the sources for the others.

One farmer stacked two 4-foot diameter culverts (each 4 feet high) next to a brook. Water seeped into this "well" from the brook. Another dug out a spring and placed the same type culverts around it.

5) Labor to install the system varied from half an hour to 16 hours per pump. Excluding the 16 hour job (the dug out spring) installation averaged about 2.5 hours per pump.

6) Farmers used different techniques to prevent sediment from clogging up foot valves. This was a problem when ponds were the water source. Some suspended the foot valve off the bottom (usually about 2 feet). Other techniques included putting the valve on a tire filled with rocks or inside a pail.

7) Little time is required to unbolt the pump, drain the system, and then reverse the process in the spring. Pumps are usually stored in a barn while most of the black plastic is drained and left in the fields. Platforms are left outdoors.

Time required for taking the system out in the fall and replacing it in the spring was estimated by about half the farmers at half an hour per pump. The other farmers needed about an hour per pump.

8) The average age of the pumps on the survey is 4 years. They are relatively maintenance free. Two farmers needed to replace foot valves (they blamed sediment) while another farmer who owns two pumps had to clean one pump's "bladder" once every 2 years. (This took about 15 minutes.)

No other maintenance was reported.

9) Twelve to 40 animals were served by each pump, with an average of 23. Most were dairy cows although some were beef, heifers, or dairy replacements. Some farmers stated that the animals "took" to the pump quickly while other stated the opposite. Most farmers demonstrated how to use it then the "smarter and more patient" animals taught the other animals. Some animals never did learn.

Several farmers said that the fact that only one animal can drink at a time is a disadvantage. The other animals would not "wait in line" but would go to the tank at the barn or wait until inside the barn to drink. One farmer worried that his cows would not get enough to drink so

he used the pumps only with his heifers. (He acknowledges that his cows probably would have learned to use the pump eventually.)

Pumps and platforms have an estimated life of 30 years; foot valves, 10 years; and black plastic pipe, 20 years. Pumps cost about $350; foot valves, $10; pipe, $40; and platform (including installation) $50.

Amortizing component costs at 10 percent over their lives gives an average annual cost of $49 per system.

This averages about $2 per year per animal served.

Environmentally, pasture pumps benefit water quality. Farmers reported that previous to their use of the pumps animals drank directly from ponds, streams, or springs, polluting the water sources with their wastes and eroding embankments.

Hydro-Rams

Although not widely used nor well known in Maine, hydro-rams are not a new idea. They were used in Europe around 1750. They offer an inexpensive watering alternative if falling water is available.

A hydro-ram captures the energy of falling water to move water both vertically and horizontally.

A minimum 2-foot drop of at least 1-3 gallons per minute (gpm) within several hundred yards of the hydro-ram is sufficient to drive the system. The hydro-ram will lift water at least 10 feet for each foot of fall and will move it a great distance horizontally.

The intake with strainer is pointed downstream to minimize debris pickup. The supply or drive pipe should be a hard material. The discharge pipe from the hydro-ram should be a flexible material.

One central Maine farmer used a 3-foot vertical fall in a brook to lift water 10 feet and carry it 200 feet into a watering tank.

Installed in 1988 this system cost $314 ($124 for the hydro ram, $90 for pipes and clamps and $100 for labor). With an estimated 50-year life for the pump, the annual expense of the system would be about $1 per cow, using 10 percent interest.

This hydro-ram provided water to 30 cows and served 12 paddocks.

It takes 1-1.5 hours to drain the pipe, store the pump, and reinstall the system in the spring.

Dry years could create the problem of insufficient flow to keep intakes clean. This happened in 1989 as the flow was insufficient to flush algae from the intake area. The farmer had to clean algae three times from the intake and pipes. (Shaking the pipes was sufficient). He plans to put a barrel around the intake to keep algae away in the future.

Since hydro-rams need a constrant flow of water, there is always an overflow to be managed. In this case overflow was returned to the brook via a natural channel.

By diverting animals from drinking directly from the brooks, hydro-rams improve water quality. Animals no longer deposit wastes in brooks nor erode banks.